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## INDO-MALAYAN AND PAPUAN FIG WASPS (HYMENOPTERA, CHALCIDOIDEA) 7. AGAONIDAE, MAINLY CAUGHT AT LIGHT

by

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With 38 text-figures

### ABSTRACT

Revision of *Pleistodontes* Saunders, with descriptions of new species *mandibularis* (type ♀, Sentani, SW Cyclops, NW New Guinea; host — from another locality — *Ficus glandifera* Summerh. var. *brachysyce* Corner), *galbinus* (type ♀, Bodem, SE Oerberfaren, NW New Guinea), and *longicaudus* (type ♀, same locality); locality records for three species of *Deilagaon* Wiebes; and description of a new species of *Waterstoniella: clavata* (type ♀, N Kalabakan, N Borneo).

Many light catches of Agaonidae, from all over Asia and Australasia, were made by personnel of the Bernice P. Bishop Museum, Honolulu (abbreviated BMH in the text of this paper). This material was received on loan in 1964, but it took many years before it could be described and identified. In the mean time, the collection was augmented by material from the American Museum of Natural History, New York (AMNH), and the Zoologische Museum, Copenhagen (ZMC), mainly collected by the 6th Archbold Expedition to New Guinea and the Noona Dan Expedition 1961-62, respectively; and also from the United States National Museum, Washington (USNM) and the California Academy of Sciences, San Francisco (CAS). Some of the species could be recognized in samples reared from figs (identified by Prof. Corner), now preserved in the Rijksmuseum van Natuurlijke Historie, Leiden (RMNH). One other source of interesting material for the present paper is the F. X. Williams collection (Hawaiian Sugar Planters' Association, HSPA). Thanks are due, for making the material available for my study, or for other services kindly rendered by the following colleagues: P. H. Arnaud jr., San Francisco; B. D. Burks, then at Washington; E. J. H. Corner, Cambridge; G. Gordh,

Washington; J. L. Gressitt and C. M. Yoshimoto, at that time in Honolulu; J. Krikken, Leiden; B. Petersen, Copenhagen; J. G. Rozen jr., New York.

The identification of the material resulted in the revision of two genera viz., *Pleistodontes* Saunders and *Deilagaon* Wiebes — many localities for the species of which are recorded, and the description of a new species of *Waterstomiella* Grandi closely resembling *Deilagaon*. A list of the species of *Pleistodontes* treated, with an indication of their host *Ficus* (as far as known), is presented in table 1. There is no apparent parallel in the classification of the figs in three subseries, and the grouping of the wasps. Some of the records are further discussed in the text.

TABLE 1. Hosts of *Pleistodontes*

<i>Pleistodontes</i> Saunders	FICUS, section Malvanthera		
	series Malvanthereae		
	Malvanthereae	Platypodeae	Hesperidiiformes
<i>P. mandibularis</i> sp.n.	<i>F. glandifera</i> var. <i>brachysyce</i>		
<i>P. imperialis</i> Saunders		<i>F. rubiginosa</i> <sup>1)</sup>	
<i>P. froggatti</i> Mayr	<i>F. macrophylla</i>		
<i>P. regalis</i> Grandi			<i>F. pleurocarpa</i>
<i>P. blandus</i> Wiebes	<i>F. glandifera</i>		
<i>P. rennellensis</i> Wiebes			
<i>P. rieki</i> Wiebes			<i>F. xylosyca</i>
<i>P. galbinus</i> sp.n.			
<i>P. longicaudus</i> sp.n.			
<i>P. plebejus</i> Wiebes			<i>F. hesperidiiformis</i>
	series Cyclanthereae		
<i>P. immaturus</i> Wiebes		<i>F. sterrocarpa</i>	

### ***Pleistodontes* Saunders**

A bibliography and a review of the host records were given with the descriptions of four new species by Wiebes (1963b); later (Wiebes, 1968) the description of a subspecies was added. The present chapter contains three new species, next to many additional locality records.

The species named by Girault. — The key, given below, does not contain any of the species named by Girault, the descriptions of which are in-

1) *P. imperialis* was also recorded from *Ficus platypoda*; see Wiebes (1963b: 309).

appropriate for recognition. The provenance of Girault's species is the mainland of Australia, except for one from Lord Howe Island. Judging from the distribution of the fig species of the section *Makvanthera*, as given by Corner (1965: 24-28), there is no risk of synonymy when describing extra-limital *Pleistodontes* without knowing Girault's Australian taxa. The only more widely distributed species also occurring on the mainland of Australia, is *Ficus obliqua*, which in Queensland harbours a species close to *Pleistodontes imperialis* (see Wiebes, 1963b: 308-309). As none of the species described in the present paper can be confused with *P. imperialis*, all this relieves me of the trouble to study Girault's type specimens. In some instances the identity of the species may be inferred from the host record mentioned by Girault. It is a moot question, of course, whether the identifications of the figs are any better than his descriptions of the wasps! The latter, most of them taken from Girault's obscure private publications, are listed here, with some remarks added.

*Pleistodontes froggatti* Mayr (Girault, 1927: 338): "A female of this species taken at light, Cairns, Queensl. (A. M. Lea). It agrees with Grandi's figures, but funicle 2 was distinctly shorter in proportion to 3, only half longer than wide, and only about  $\frac{1}{2}$  of 3. Ovipositor  $\frac{2}{3}$  abdomen." The difference mentioned here may have been the cause for Girault's later (1939: 325) renaming of Grandi's material; see below under *P. mayri*.

*Pleistodontes imperialis* Saunders (Girault, 1915b: 311): "Habitat: Australia. Fruit of *Ficus macrophylla*." It should be noted that this fig is known as the host of *P. froggatti*.

*Pleistodontes listzi* Girault (1932: 2): "From *nigris*: Leg 1 pale; funicle 1 black; wing 2 12 lines cilia; funicle 2 a bit shorter than 3, latter 4  $\times$  longer than wide, equal 4, 5-6 a bit longer than wide. Scape, pedicel, appendage, orange. Gatton, 21 Dec., 1931. B. Blumberg."

*Pleistodontes mayri* Girault (1939: 325): "new name. For *Pleistodontes froggatti* Grandi, 1916, Boll. Lab. d'Zool. gen. e agrar. d'scu. Sup. d'Agric., Portici, 11: 150-159 not *P. froggatti* Mayr years earlier." As I have noted before (Wiebes, 1963b: 307), this new name appears to be quite redundant.

*Proceratosolens medionigra* Girault (1933: 3-4): "*Proceratosolens* (Fig insects). From *Pleistodontes*: Head  $\frac{1}{2}$  longer than wide; antennae 10-jointed, *P. medionigra*, Black, scape yellow, legs pale save trochanters, femora

of leg 2, femora 1, 3 dorsal, coxa 2. Ovipositor equal abdomen. Pedicel wider than long, funicle 4 longest,  $1/2$  longer than wide. Polished. Buderim, Feb., A. R. Brimblecombe."

*Pleistodontes nigricaput* Girault (1927: 337): "Differs from *P. imperialis* in having the underside of femora, the scape, the tibiae, and tarsi yellow, wings hyaline; and from *P. froggatti* in having the scape short and convexly dilated, and in other ways; from *P. nigris* in the colour of the femora, and perhaps in the male. Male: Head black, rest of body white; the hind margin of head convex and entire, club notably short, almost quadrate and truncate at apex. Female: Head nearly twice longer than wide, jaws at least 4-dentate, funicle 2 cup-shaped, a bit longer than wide and distinctly smaller than 3, latter half longer than wide, equal 4, pedicel globular, small. The scape bears a distinct tubercle just before middle, but this is on the shaft, and is covered by the regular convex expansion. S. Aust.: Adelaide: Many specimens from *Ficus rubiginosus*. Also six females from same host, N.S. Wales, Sydney (A. J. Coates)." The host record suggests a similarity with *P. imperialis*, and I do not find much in the description contradicting this.

*Pleistodontes nigris* Girault (1925: 2): "Black, scape, pedicel, tibiae, tarsi pale yellow, wings clear, appendage yellow. Hind wings 6 lines discal cilia. Second, coloured joint funicle longest, longer than wide by far; appendage-bearing minute, pale, appendage attaining apex next joint. Otherwise as in *nigriventris*. Moreton Bay Figs, Brisbane, H. Hacker, March, 1914. Scape with no tubercle beneath. First coloured funicle cup-shaped." A synonym of *Pleistodontes froggatti* Mayr?

*Agaon nigriventre* Girault (1915a: 44-45) and *Pleistodontes nigriventris* Girault (1915b: 311): "Female. Length, 2.20 mm., excluding ovipositor which is exerted for a length about equal to that of the abdomen. Head not quite twice longer than wide. Postmarginal vein longer than the stigmal, the latter long. Orange yellow, the posterior margin of the head, flagellum, all of abdomen except at base, a hourglass-shaped marking down meson of pronotum and cephalic part of scutum (a smaller end cephalad; shaped like an inverted eggcup), a stripe across apex of thorax (about apex of scutellum), the tegulae and a dot in a line longitudinally with them, cephalad (opposite the apex of the eggcup-shaped marking), jet black; also the valves of the ovipositor. Mandibles bidentate at apex (but 5-dentate), the antennae 11-jointed without a ring-joint, the scape hemispherically dilated (foliaceously). Third and fourth funicle joints subequal, longest, longer than the

pedicel which is subequal to the distal funicle joint. Postmarginal vein longer than either marginal or stigmal, the latter shortest. Wings hyaline. Body glabrous. Pedicel wider than long; funicle 1 with the process which encloses 2, the latter longer than wide. Habitat: Mount Tambourine (type), Queensland and Tweed River, New South Wales. Type: No. Hy3360, Queensland Museum, Brisbane, the female on a tag, the head on a slide." The two homonyms also are objective synonyms (see Riek in Wiebes, 1961: 237). The two descriptions are almost identical, but for the clause on the antennae which in the Canad. Ent.-paper are said to be "9-jointed".

*Neoceratosolens nitens* Girault (1915b: 312-313): "*Neoceratosolens* new genus. Female: Antennae 10-jointed, the club 3-jointed; first funicle joint with a sheath-like process; scape greatly flattened. Head much longer than wide, one and a half times longer than wide, with a deep median channel. Postmarginal vein subequal to marginal, each a little longer than the stigmal. Ovipositor extruded for two thirds the length of the abdomen. Head, thorax and abdomen subequal in length. Pronotum quadrate, somewhat longer than the scutum which is subequal to the scutellum. Parapsidal furrows absent. Hind tibiae wider than long, smaller than the hind coxa, the single spur stout and with a distinct notch (fork) at tip; the whole resembling somewhat a whench. Body highly polished but with very minute punctures here and there. No ring-joint. *Neoceratosolens nitens* new species. Genotype. Female: Length, 3.75 mm., excluding ovipositor. Black, the ventral surface, legs, scape, pedicel and funicle 1 rich yellowish brown; wings hyaline. Pedicel quadrate, funicle 1 smallest, joints 2-5 subequal, each somewhat longer than wide at apex. Flagellum gradually thickening distad. From one specimen taken in the jungle, February 14, 1914 (A. P. Dodd). Habitat: Babinda, Queensland. Type: No. Hy3364, Queensland Museum, Brisbane, one female on a tag, the head on a slide."

*Pleistodontes semiruficeps* Girault (1929: 318): "Like *P. froggatti* in structure of antennae and head but entirely black, the head red except proximal (or dorsal)  $\frac{1}{4}$  (from ventral eye ends), this part of the head, jet. Legs and first five antennals red-brown. Ovipositor not quite as long as abdomen. Many females on Banyan figs, Lord Howe Island (A. M. Lea)." From the host record "Banyan figs", Grandi (1952b: 96) concluded that the specimens were caught on *Ficus religiosa*; later I suggested (Wiebes, 1963a: 96) an identification with *F. rubiginosa* or one of its relatives instead. Corner (1965: 25) especially mentioned *F. macrophylla* from Lord Howe Island, and in his map of the specific abundance of *Ficus* in Asia and

Australasia (Corner, 1963: 234, fig. 1) he numbered only one species for this island. In my opinion, Girault's description of *P. semiruficeps* does not seriously contradict its identity with *P. froggatti*, the Agaonid associated with *F. macrophylla*.

Pollinating organs. — Ramirez (1969: 581) noted that *Pleisodontes imperialis* has sternal pockets only, but from the table in his 1974-paper it is clear that he did also see the shallow coxal corbiculae. In the same paper (Ramirez, 1974: 778), most Agaonids associated with figs of section *Malvanthera* were stated to be characterized by the absence of sternal pockets, and *Pleistodontes* was said to eat pollen. I find sternal pollen pockets in *P. froggatti*, *imperialis* and *regalis*, while *P. imperialis*, moreover, has coxal corbiculae, as stated above. In *P. froggatti* this is not as clear, although a comb of setae borders the axial edge of the fore coxa (faintly indicated in Grandi, 1916: 153, fig. iii 2). *P. blandus* (fig. 1) and *mandibularis* have only coxal corbiculae, and in *P. blandus* the mesosternum bears a number of long setae (but in *P. rennellensis* I also find a very vague trace of a sternal pocket); *P. galbinus* (fig. 2) and *regalis* have a rather extensive field of setae on the axial edge of the coxa, but no regular corbicula nor a distinct comb. The species *P. longicaudus*, *plebejus*, *immaturus*, and *rieki* have no pockets and no corbiculae, the mesosternum as well as the axial surface of the coxa being rather smooth.

In many Agaonid species, pollen can sometimes be found in small quantities on several places of the body e.g., between the mouth parts or under the hypopygium. In the species of *Pleistodontes* the axial, disto-dorsal excavation of the antennal scapes may be such a place, and in one example — the holotype of *P. longicaudus* — I actually saw clusters of pollen in these cavities.

#### KEY TO THE SPECIES OF PLEISTODONTES

(the males of *P. mandibularis*, *rennellensis*, *galbinus*,  
*longicaudus*, and *immaturus* are not known)

- |   |                     |
|---|---------------------|
| 1. Females . . . . .  | 2                   |
| — Males . . . . .   | 12                  |
| 2. Mandibular tooth sharp, falcate (fig. 7), the surface of the mandible rather smooth . . . . .        | <i>mandibularis</i> |
| — Mandible with normal apical tooth (e.g., fig. 24), the ventral surface with distinct ridges . . . . . | 3                   |
| 3. Sternum with distinct pollen pockets . . . . .   | 4                   |
| — Sternum without distinct pollen pockets . . . . .   | 6                   |
| 4. Head $2\frac{1}{2}$ -3 times as long as wide across the compound eyes. Mandi-                        |                     |

- bular appendage with rows of small teeth. Fore tarsus with conical spines on the anti-axial surface . . . . . 5
- Head not quite twice as long as wide across the compound eyes. Mandibular appendage with almost straight lamellae, medially and laterally produced into teeth. Fore tarsus without conical spines . . . *imperialis*
5. Rows on the mandibular appendage well spaced, ca. 40 in number. Fore metatarsus with about 20 conical spines . . . . . *froggatti*
- Rows on the mandibular appendage very close, ca. 70 in number. Fore metatarsus with about 40 conical spines . . . . . *regalis*
6. Mandible with ca. 15 ventral ridges. Total length up to slightly over 2 mm; head rather wide (length/width, 1.2-1.5) . . . . . 7
- Mandible with less than ten ventral ridges. Total length ca. 3 mm or longer; head more elongate (length/width, 2-3) . . . . . 8
7. Longitudinal diameter of the compound eye about half as long as the cheek. Ventral ridges between the medial and lateral teeth of the mandibular appendage finely crenulate. Postmarginal vein approximately twice as long as the stigmal. Hypopygium blunt at apex . . . . . *blandus*
- Longitudinal diameter of the compound eye about as long as the cheek. Ventral ridges between the medial and lateral teeth of the mandibular appendage almost straight. Postmarginal vein longer, almost thrice as long as the stigmal. Spine of the hypopygium sharp . . . *rennellensis*
8. Temple i.e., the space proximad of the compound eyes, almost non-existent . . . . . 9
- Temple distinct i.e., equal to the longitudinal diameter of the eye, or longer . . . . . 11
9. Ovipositor short, two-thirds of the length of the gaster. Antennal segments with one row or sensilla. Rows on the mandibular appendage rather strong and coarse, widely spaced . . . . . *rieki*
- Ovipositor twice as long as the gaster. Antennal segments with 2-3 rows of sensilla. Rows on the mandibular appendage finer, closer together . . . . . 10
10. Longitudinal diameter of the compound eye not quite half as long as the cheek. Mandibular appendage with ca. 50 rows. Spine of the hypopygium approximately twice as long as its basal width . . . *galbinus*
- Longitudinal diameter of the compound eye one quarter of the length of the cheek. Mandibular appendage with 70-80 rows. Spine of the hypopygium approximately four times as long as its basal width . . . . . *longicaudus*
11. Temple equal to the longitudinal diameter of the eye; the cheek twice as long as the eye. Number of rows on the mandibular appendage ca. 35.

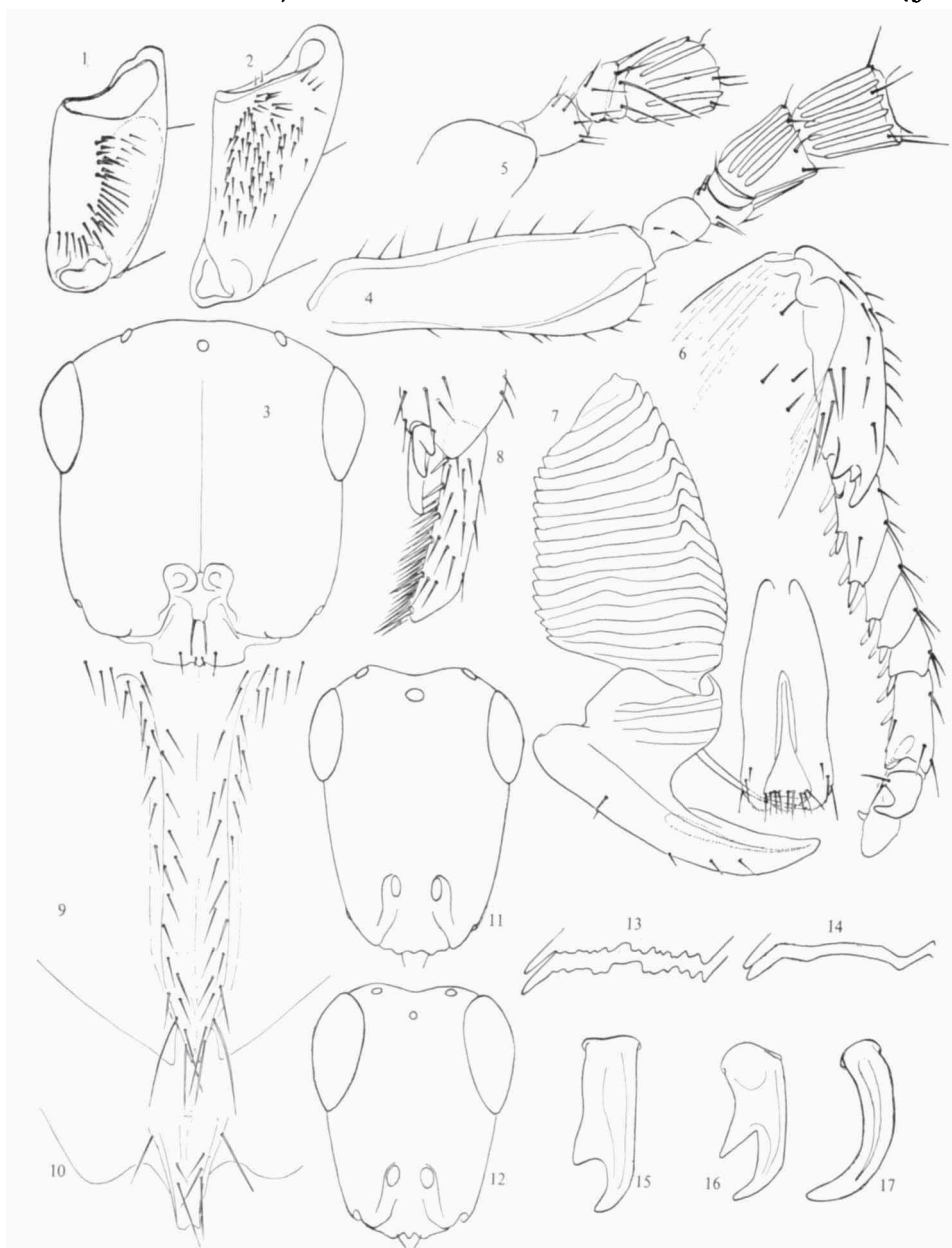
- Armature of the fore tibia consisting of four teeth . . . *immaturus*
- Temple almost twice the longitudinal diameter of the eye, which is half as long as the cheek. Number of rows on the mandibular appendage ca. 75. Armature of the fore tibia consisting of two large teeth *plebejus*
12. Antennal funicle consisting of two, incompetely separated, segments. Mesonotum, metanotum and propodeum fused into one sclerite *blandus*
- Antennal funicle consisting of three distinct segments . . . . . 13
13. Genitalia without claspers . . . . . 14
- Genitalia with claspers . . . . . 15
14. Head depress, half as high as long. Combined lengths of head, thorax and propodeum, ca. 1.4 mm; colour light yellow-brown . . *froggatti*
- Head less depress, almost as high as long (4:5). Combined lengths of head, thorax and propodeum, ca. 1.8 mm; colour dark brown . . *regalis*
15. Segments of the antennal funicle subquadrate. Claspers of the genitalia without claws . . . . . *plebejus*
- Segments of the antennal funicle relatively shorter, transverse. Claspers of the genitalia with claws . . . . . 16
16. Metanotum fully fused with the propodeum. Claspers of the genitalia with two claws . . . . . *imperialis*
- Metanotum laterally separated from the propodeum. Claspers of the genitalia with five claws . . . . . *rieki*

**Pleistodontes mandibularis** spec. nov. (figs. 3-8)

Type-material. — NEW GUINEA, West, Sentani, SW Cyclops, 100 m, leg. J. L. Gressitt & T. C. Maa, (MV) light trap, 15.vi.1959 (3 ♀ BMH, holotype dissected and slide-mounted, one paratype in RMNH 2888), 20-24.vi.1959 (1 ♀ BMH); Sarmi, 20-23.vii.1959, leg. T. C. Maa, MV light trap (1 ♀ RMNH 2889); River Tor (mouth), 4 km E Hol Maffen, 2-5.vii.1959, light trap (1 ♀ BMH); Waris, S Hollandia, 450-500 m, 8-15.viii.1959, leg. J. L. Gressitt, light trap (1 ♀ BMH).

Female. — Head (fig. 3) about as long as wide across the compound eyes; the longitudinal diameter of the eye somewhat shorter than the cheek (9:11). Three ocelli. Median sulcus closed. Epistomal edge rather large, prominent. Antennal toruli close together, situated at three quarters of the length of the head. Antenna (figs. 4-5) eleven-segmented; the scape over three times as long as wide, without a ventral protuberance; the pedicel oblong; the third segment and its appendage short, scarcely reaching beyond the apex of the cupulate fourth segment, which bears long setae; the fifth to eleventh segments subequal, with 6-8 sensilla per facies, from the seventh onwards with long setae interspersed between the sensilla. Mandible (fig. 7) falcate, some ventral ridges scarcely visible; one gland; the appendage short and wide, with about twenty ventral lamellae, medially produced into teeth; the





Figs. 1-2. Coxal corbicula of 1, *Pleistodontes blandus* Wiebes; 2, *P. galbinus* spec. nov. Figs. 3-8. *P. mandibularis* spec. nov., female holotype. 3, head; 4, basal segments of antenna, antiaxial aspect; 5, do., detail in axial aspect; 6, apex of fore femur, tibia and tarsus, antiaxial aspect; 7, trophi; 8, apex of hind tibia, and metatarsus, antiaxial aspect. Figs. 9-10. Hypopygium of 9, *P. regalis* Grandi; 10, *P. froggatti* Mayr. Figs. 11-17. Comparison of *P. blandus* Wiebes (11, 13, 15, all from RMNH 916) and *P. rennellensis* Wiebes (12, 14, 16, all from locality 6; 17 from locality 10: see map of fig. 18). 11-12, head; 13-14, 14th and 15th rows of mandibular appendage; 15-17, axial spur of hind tibia. Figs. 1-3, 9-12, X 105; 4-8, 13, 14, X 210; 15-17, X 415.

maxilla with three apical and subapical setae, the labium with ca. ten apicals.

Thorax. Fore wing (17:4), 1.3 mm long, the submarginal, marginal, stigmal, and postmarginal veins approximately in ratio 26:10:5:12; hind wing (4:1), 0.6 mm long; the membrane hyaline, with sparse microtrichia. Fore leg: the coxa with a corbicula; the tibia (fig. 6) with three apical teeth viz., two large and one smaller in between; the tarsus with stout spines, the segments approximately in ratio 8:3:3:3:7. Mid leg, tarsal ratio 8:3:2:2:4. Hind leg: tibial armature (fig. 8) consisting of one bicuspidate antiaxial tooth and a slender axial; the tarsal segments approximately in ratio 7:4:3:2:4, with spines and a plantar fringe.

Gaster. Hypopygium not well visible in any of the (dried) specimens; spine short. Pygostyle with four setae.

Length (head, thorax, and gaster), ca. 1.8 mm; the ovipositor 2 mm i.e., somewhat longer than the body. Colour brownish.

Host. — Remnants of a female were found inside a not quite mature receptacle (herbarium material) of *F. glandifera* Summerh. var. *brachysyce* Corner (det. Corner), from New Guinea, Morobe distr., Bulolo, NGF no. 7422 (see Corner, 1960: 402) (RMNH 2890, slide-mounted). For a discussion, see under *P. blandus* and *rennellensis*, below.

#### **Pleistodontes regalis** Grandi (fig. 9)

Material. — QUEENSLAND, Malanda, 15.vi.1966, leg. D. Nickelson, ex *Ficus pleurocarpa* F. v. M. (det. E. J. H. Corner) (1 ♀ 4 ♂ RMNH 1018, the ♀ dissected and slide-mounted).

Remarks. — Although the specimens are distinctly larger than those of *P. froggatti* Mayr (i.e., ♀ 3.2 mm against 2.2 mm for *P. froggatti*, ♂ head and thorax 1.8 mm against 1.4 mm), the species are much alike. Both have the trilobed epistomal margin in the female (Grandi, 1916, fig. ii 1), the spinose fore tarsi (with ca. 40 conical spines on the metatarsus in *P. regalis*, ca. 20 in *P. froggatti*), and the strikingly large stigmal peritremata of the eighth urotergite (Grandi, 1952a, fig. xii 5). It is surprising that Corner (1965: 26, 28) has the host *Ficus* far apart viz., *F. rubiginosa* in subseries *Platypodeae*, *F. pleurocarpa* in *Hesperidiiformes*!

An easy differential character in the female is the number of rows of denticles on the mandibular appendage viz., there are ca. 40 in *P. froggatti* (the space between the rows is rather large relative to the size of the denticles: Grandi, 1916, fig. ii 5), while *P. regalis* has over 70 (the rows are very close together: Grandi, 1952a, fig. x 5). In *P. regalis*, the spine of the hypopygium (fig. 9) is shorter, and the setae are larger and more in

number, than in *P. froggatti* (fig. 10). Length (head, thorax, and gaster), 3.2 mm, ovipositor 1 mm, as against 2.2 and 0.8 mm for *P. froggatti*.

*Pleistodontes blandus* Wiebes and *rennellensis* Wiebes (figs. 11-20)

On inspection of almost one hundred light catches from New Guinea, the Bismarck Archipelago, and the Solomon Islands (map, fig. 18), all proved to belong to the form originally described from (and then supposed to be particular to) Rennell Island. The sympatric and apparently synchronous occurrence on San Christobal of both light catches of *rennellensis* and reared samples of *blandus*, raises doubts as to the specific identity of the two forms. Morphologically, they differ significantly in the general shape of the head (figs. 11-12), the dentition of the mandibular appendage (figs. 13-14), the venation of the fore wing, and in the form of the hypopygium (figs. 19-20); moreover, there is some variation in the shape of the axial tooth of the hind tibia (figs. 15-17). Although, relatively to the other species of *Pleistodontes*, they are rather close, I treat them here as full species.

*P. blandus* pollinates *Ficus glandifera* Summerh. Previously (Wiebes, 1968: 117), I suggested *P. rennellensis* to be the pollinator of *F. glandifera* var. *brachysyce* Corner, because this form was recorded from Rennell Island (Corner, 1967a: 65). This variety is widely distributed: South Celebes, Territory of New Guinea, Solomons (Corner, 1967b: 70), while true *F. glandifera* is known from Papua, New Britain, Solomons, Santa Cruz Isl., New Hebrides. Although the fig is common (or because it is common? see Corner, 1975: 344), no reared samples of wasps from var. *brachysyce* are available. I took a dried receptacle from a herbarium specimen, in order to see whether any female remnants could be found. Unexpectedly, it proved to contain a head and one fore leg, undoubtedly belonging to quite another species i.e., *P. mandibularis*! More samples are eagerly awaited.

***Pleistodontes blandus* Wiebes (figs. 1, 11, 13, 15, 18, 19)**

Material. — SOLOMON I., Ysabel Isl., Tetamba, 29.ix, 1.x & 5.x.1965, leg. E. J. H. Corner, ex *Ficus glandifera* Summerh. (det. Corner) (series ♂ ♀ RMNH 916, 920, 923); San Cristobal, 7.viii.1965, leg. E. J. H. Corner, ex *Ficus glandifera* Summerh. (det. Corner) (2 ♀ series ♂ RMNH 915; Humi R., RSS 24: series ♀ ♂ RMNH 909).

***Pleistodontes rennellensis* Wiebes (figs. 12, 14, 16-18, 20)**

Material (BMH, unless otherwise indicated). — NEW GUINEA, West, Biak I, 22-30.vi.1962, leg. T. C. Maa (1 ♀); Nabire, S Geelvinkbay, leg. J. L. Gressitt and/or J. Sedlacek, or H. Holtmann, light trap or in jungle: 0-30 m 2-9.vii.1962 (3 ♀, two in RMNH 2882), 5-50 m 25.viii-2.ix.1962 (3 ♀, one dissected and slide-mounted — no. 1 on map of fig. 18), 10-40 m 10.x.1962 (1 ♀); Sarmi, 20-23.vii.1959, leg. T. C. Maa, MV light trap (1 ♀); Hol Maffen, 22 km E Sarmi, 18-19.vii.1959, leg. T. C. Maa (1 ♀); Bodem, 11 km SE Oerberfaren, 100 m, 7-17.vii.1959, leg. T. C. Maa, MV light trap

(13 ♀, three in RMNH 2887); W Sentani, Cyclops Mts, 150-250 m, 16.vi.1959, leg. T. C. Maa (1 ♀, dissected and slide-mounted; no. 2); Sentani, 15.vi (1 ♀) and 20-24.vi.1959 (1 ♀), leg. J. L. Gressitt & T. C. Maa, light trap; Hollandia, 100 m, 23.viii.1955, leg. J. L. Gressitt, light trap (2 ♀); Hollandia-binnen, 25 m, 16.x.1957, leg. J. L. Gressitt, light trap (1 ♀, dissected and slide-mounted; no. 3); Waris, S Hollandia, 450-500 m, leg. T. C. Maa: 16-23.viii.1959 (1 ♀), 24-31.viii.1959 (3 ♀, one dissected and slide-mounted; no. 4). Northeast, Torricelli Mts, Mobitei, 750 m, 16-31.iii.1959, leg. W. W. Brandt (2 ♀, one dissected and slide-mounted; no. 5); Dreikikir, 350 m, 25.vi.1961, leg. J. L. Gressitt, light trap (1 ♀, dissected and slide-mounted; no. 6); Maprik, 160 m, 14.x.1957, leg. J. L. Gressitt, at light (2 ♀); Wum, upper Jimmi V, 840 m, 18.vii.1955, leg. J. L. Gressitt, light trap (3 ♀, one dissected and slide-mounted — no. 7; 2 ♀ in RMNH 2883); Adelbert Mts, Wanuma, 800-1000 m, 26.x.1958, leg. J. L. Gressitt (6 ♀); Finisterre Range, Saidor, Gabumi village, 24-30.vi.1958, leg. J. L. Gressitt (1 ♀); Kratke Mts, Arau, Valley of upper Wanton R, 1400 m, 19-23.x.1959, leg. L. J. Brass (6th Archbold Exp.) (1 ♀ AMNH); Umi R, Morobe distr., Markham V, 480 m, 20.xi.1959, leg. L. J. Brass (6th Archbold Exp.) (3 ♀ AMNH); Gurakor, Morobe distr., Wampit R Valley, 45 mi from Lae, 670 m, 8.v.1959, leg. L. J. Brass (6th Archbold Exp.) (1 ♀ AMNH); Oomsis, 22 mi W Lae, on Lae-Bulolo Rd, 100 m, 26.vi.1959, leg. L. J. Brass (6th Archbold Exp.) (4 ♀ AMNH); Wau, Morobe distr., 1200 m, leg. J. L. Gressitt and/or J. H. Sedlacek, light trap: 15.vi.1961 (1 ♀), 28-30.vi.1962 (1 ♀), 2-3.vii.1962 (1 ♀), 3.vii.1962 (1 ♀, dissected and slide-mounted; no. 8).

NEW IRELAND, Gilingil Pt'n, 2 m, 5.vii.1956, leg. J. L. Gressitt, light trap (4 ♀, one dissected and slide-mounted — no. 9; 2 ♀ in RMNH 2884).

SOLOMON I, Bougainville, 4.vi.1956, leg. E. J. Ford & J. L. Gressitt, light trap (8 ♀, one dissected and slide-mounted; no. 10); Sohano, 13.vi.1956, leg. J. L. Gressitt, light trap (1 ♀); Boku, 6.vi.1956, leg. J. L. Gressitt, light trap (2 ♀); Kokure, 690 m, leg. E. J. Ford & J. L. Gressitt, light trap: 8.vi.1956 (5 ♀, one in RMNH 2885), 9.vi.1956 (4 ♀, one in RMNH 2885), 10.vi.1956 (5 ♀, one in RMNH 2885); Kieta, 12.vi.1956, leg. J. L. Gressitt, light trap (2 ♀). New Georgia, Kolombangara, Sandfly harbor, 5 m, 6.vii.1964, leg. J. & M. Sedlacek, light trap (1 ♀). Florida Grp, Takopekopa, 12.ix.1960, leg. C. W. O'Brien, light trap (1 ♀, dissected and slide-mounted; no. 11). San Cristoval, Bweinaniawarikiapu, leg. C. W. O'Brien, light trap: 11.viii.1960 (2 ♀, one dissected and slide-mounted; no. 12), 12.viii.1960 (4 ♀, one dissected and slide-mounted — no. 13; 2 ♀ in RMNH 2886); Kira Kira, 15.viii.1960, leg. C. W. O'Brien, light trap (1 ♀).



Fig. 18. Distribution of *Pleistodontes blandus* Wiebes (double asterisks, specially indicated; type locality "Solomon Is.") and *P. rennellensis* Wiebes (simple asterisks; nos. 1-13 refer to slides made, no. 14: type locality Rennell I.).

Variation. — Some variation is apparent in the shape of the axial spur of the female hind tibia: the simple, slender spur (fig. 17) was found in specimens from localities 2, 5, 8-14; the bidentate, more robust spur (fig. 16) in 1, 3, 4, 6, and 7 (see map, fig. 18).

### **Pleistodontes riei** Wiebes

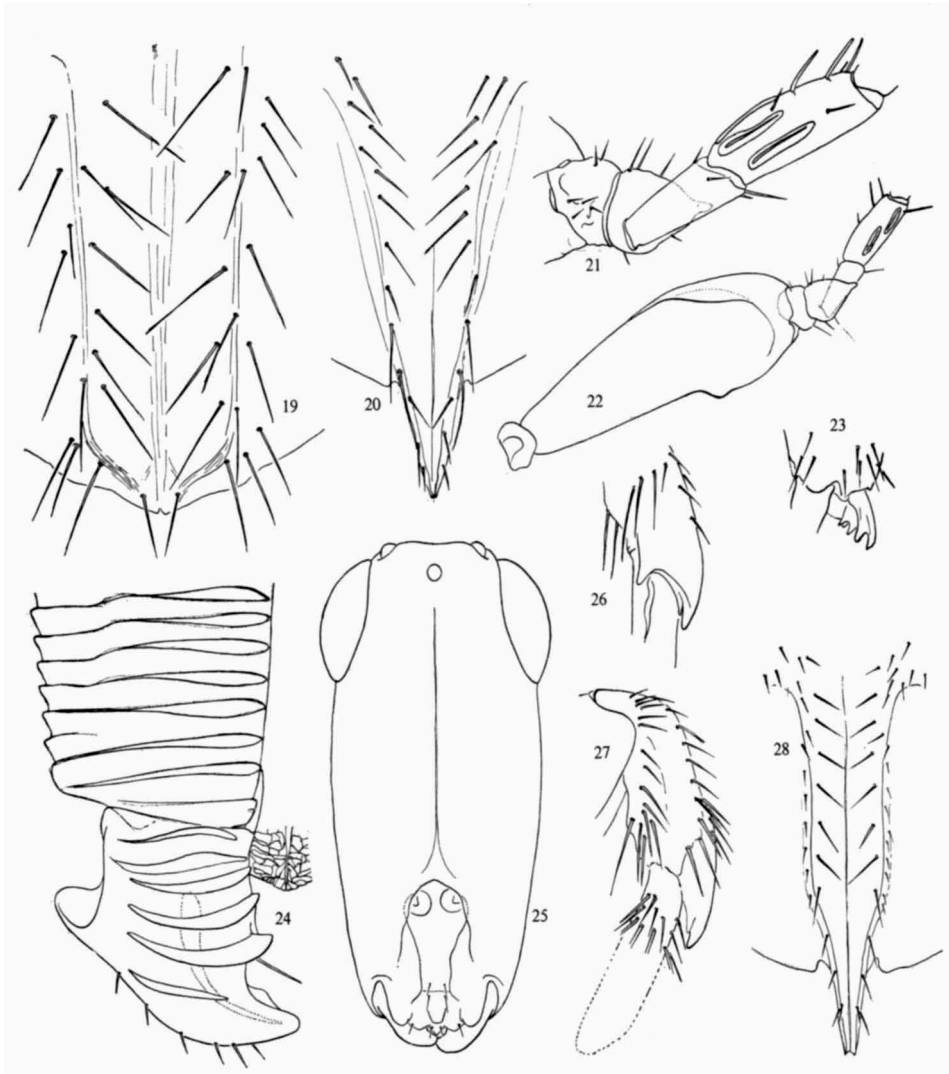
Material. — NEW GUINEA, West, Bodem, 10-17.vii.1959 (2 ♀, one dissected and slide-mounted); Waris, S Hollandia, 16-18.vii.1959 (1 ♀) (all leg. T. C. Maa, BMH). Northeast, Dreikikir, Sepik distr., 350-450 m, 23.vi.1961, leg. J. L. Gressitt (1 ♀ RMNH 2881). NEW BRITAIN, Gazelle Pen, Mt Sinewit, 900 m, 13.xi.1962, leg. J. Sedlacek, light trap (BMH).

### **Pleistodontes galbinus** spec. nov. (figs. 2, 21-28)

Type-material. — NEW GUINEA, West, Bodem, 100 m, 11 km SE Oerberfaren, 7-17.vii.1959, leg. T. C. Maa, MV light trap (BMH: 33 ♀, holotype dissected and slide-mounted; 10 ♀ RMNH 2863).

Female. — Head (fig. 25) more than twice as long as wide across the compound eyes (13:6); the longitudinal diameter of the eye two-fifths of the length of the cheek. Three ocelli. The median sulcus appears closed proximad of the antennal toruli; over a length of the distal third of the head it is wide open. Epistomal edge with three lobes. Antenna (figs. 21-22) eleven-segmented; the scape thrice as long as wide, the ventral protuberance not very prominent; the pedicel subquadrate; the third segment and its appendage triangular in outline, short, reaching to about two-thirds of the fourth segment; the fifth segment somewhat longer than the fourth (6:5), with long sensilla, and with rod-like setae in the distal half; the sixth and seventh segments subequal in length to the fifth, with two incomplete rows of sensilla; the eighth to tenth segments gradually shortening, with two more complete rows of sensilla; the eleventh as long as the fifth, with up to three full rows of oblong sensilla and some smaller, subcircular sensilla. Mandible (fig. 24) with six ventral lamellae, three of which are axially produced into teeth; the appendage with about fifty rows produced into blunt teeth axially and antiaxially. Labium atrophied; the maxillae approximately as long as the first twenty rows of the mandibular appendage, the ventral surface coriaceous.

Thorax. Fore wing (14:5), 2.2 mm long, the submarginal, marginal, stigmal, and postmarginal veins approximately in ratio 5:2:1:2; hind wing (4:1), 1.1 mm long; with dense microtrichia. Fore leg: the tibia (figs. 26-27) with two long apical teeth and a smaller one in between, and with many spine-like setae, especially axially; the tarsus with many spines and setae, the segments approximately in ratio 13:5:4:3:7. Mid leg slender, tarsal



Figs. 19-20. Hypopygium of 19, *Pleistodontes blandus* Wiebes (RMNH 916); 20, *P. rennellensis* Wiebes (locality 2, map of fig. 18). Figs. 21-28. *P. galbinus* spec. nov., female holotype. 21, basal segments of antenna, axial aspect; 22, do., anti-axial aspect; 23, apex of hind tibia, axial aspect; 24, trophi; 25, head; 26, apex of fore tibia, anti-axial aspect; 27, fore tibia and outline of metatarsus, axial aspect; 28, hypopygium. Figs. 19-21, 24, 28, X 210; 23, 26, 27, X 165; 22, X 105; 25, X 65.

ratio 8:4:3:3:3. Hind leg robust, the tibia ending in an apical hyaline edge, the armature (fig. 23) consisting of two small teeth: the axial long, forked at tip, the antiaxial more robust, tricuspidate; the tarsus with spines and a plantar fringe, the segments approximately in ratio 8:3:3:2:4.

Gaster. Hypopygium (fig. 28): the spine not very long; the peritreme of the stigma of the eighth urotergite rather large, oblong; the pygostyle slender, with one long and three shorter setae.

Length (head, thorax, and gaster), ca. 3.5 mm; the ovipositor 2 mm i.e., almost twice as long as the gaster. Colour of the body uniform light, yellowish, the head a trifle darker.

**Pleistodontes longicaudus** spec. nov. (figs. 29-33)

Type-material. — NEW GUINEA, West, Sarmi, 20-23.viii.1959, MV light trap (1 ♀); Hol Maffen, 22 km E Sarmi, 1.vii.1959, MV light trap (1 ♀), 18-19.vii.1959 (2 ♀); Bodem, 100 m, 11 km SE Oerberfaren, 7-17.vii.1959 (3 ♀, holotype and paratype dissected and slide-mounted) (all leg. T. C. Maa, BMH); Waris, S Hollandia, 16-18.vii.1959 (1 ♀), 450-500 m, 1-2.viii.1959 (1 ♀), leg. T. C. Maa (both, RMNH 2880). Northeast, Finisterre Range, Saidor, Matoko, 28.viii-5.ix.1958, leg. W. W. Brandt (1 ♀ BMH).

Female. — Head (fig. 29) more than twice as long as wide across the compound eyes (13:6); the longitudinal diameter of the eye one quarter of the length of the cheek. Three ocelli, the two laterals beyond distinct ridges. Median sulcus closed, as in *P. galbinus*. Also the other characters of the head much as in *P. galbinus*, but the median ridge, running from the antennal toruli to the median lobe of the epistomal edge, more prominent; the fifth antennal segment twice as long as the fourth, with many sensilla; the mandible (fig. 32) with seven lamellae, some of which form indistinct teeth; the appendage with 70 to 80 rows.

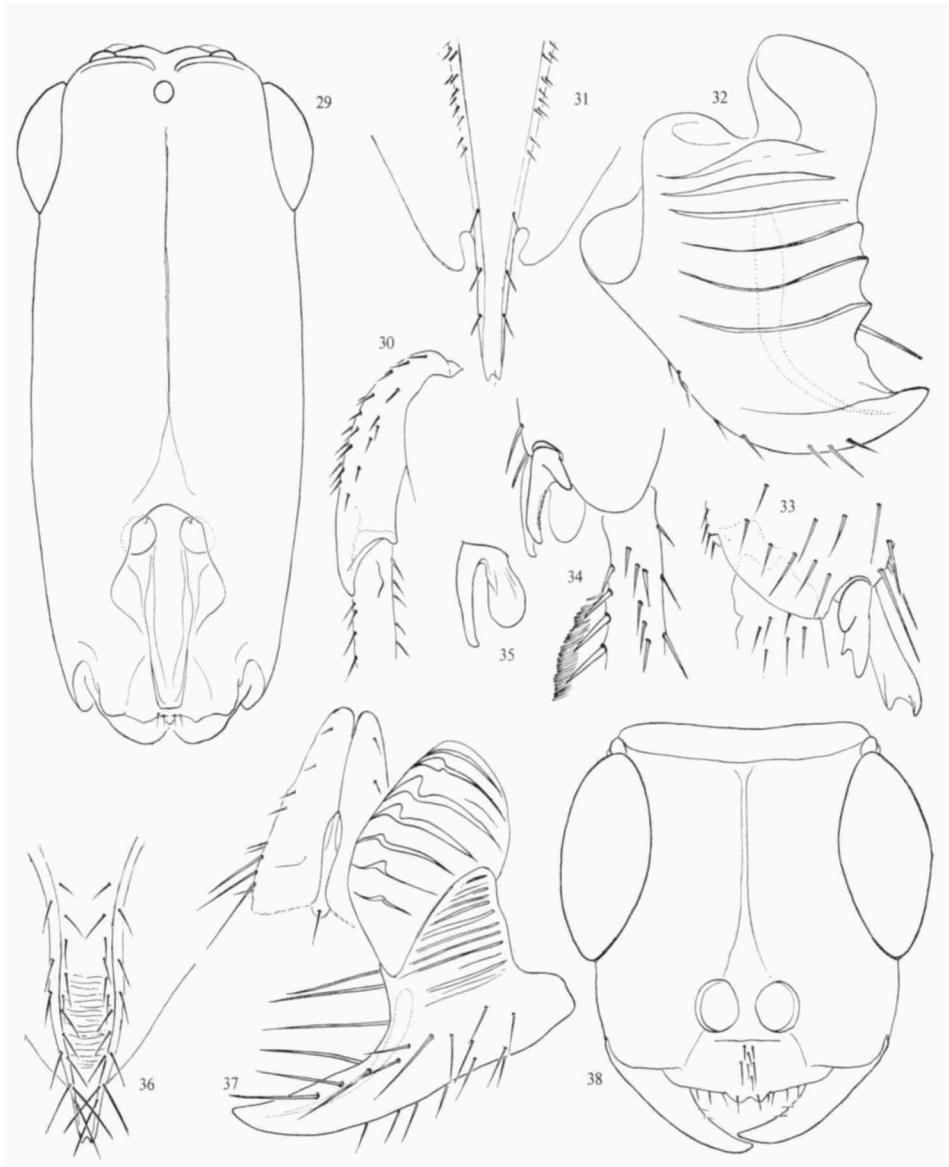
Thorax. Fore wing (5:2), 2.9 mm long, the submarginal, marginal, stigmal, and postmarginal veins approximately in ratio 12:5:2:4; hind wing (4:1), 1.5 mm long; with dense microtrichia. Fore leg, as are all legs, rather long and slender; the tibia (fig. 30) with one long dorsal tooth at the apex, and a smaller ventral, more blunt; the tarsi approximately in ratio 12:5:4:4:8. Tarsal ratio of mid leg 15:11:9:6:8. Hind tibia (fig. 33) with two apical teeth, which are relatively larger than in *P. galbinus*; the tarsus with a short plantar fringe and few spines, the segments approximately in ratio 12:6:4:3:5.

Gaster. Hypopygium (fig. 31) attenuate, with smaller setae along the longitudinal ridges, the spine long and acute; the peritreme of the eighth urotergite not very large, subcircular in outline; the pygostyle long and very slender, with four apical setae.

Length (head, thorax, and gaster), ca. 4.4 mm; the ovipositor 3.5 mm i.e., twice as long as the gaster. Colour yellow-brown; the dorsum, especially that of the gaster, brown; the head even darker.

**Pleistodontes plebejus** Wiebes

Material. — NEW GUINEA, West, River Tor (mouth), 4 km E Hol Maffen, 1.vii.1959, leg. T. C. Maa, MV light trap (1 ♀ BMH). Northeast, Sanwcp [?] river near



Figs. 29-33. *Pleistodontes longicaudus* spec. nov., female holotype. 29, head; 30, fore tibia and base of metatarsus, anti-axial aspect; 31, hypopygium; 32, mandible; 33, apex of hind tibia, anti-axial aspect. Figs. 34-38. *Waterstoniella clavata* spec. nov., female holotype. 34, apex of hind tibia and base of metatarsus, anti-axial aspect; 35, axial spur of hind tibia; 36, hypopygium; 37, trophi; 38, head. Figs. 29, X 65; 30, 31, 36, 38, X 105; 32-35, 37, X 210.



Lae, iii.1969, leg. J. S. Womersley, ex *Ficus hesperidiiformis* King (det. E. J. H. Corner) (5 ♀ 13 ♂ RMNH 2634).

### Deilagaon Wiebes

Reared samples were recorded with the descriptions of the species (Wiebes, 1977); the localities of many light catches are listed below.

### Deilagaon chrysolepidis Wiebes

Distribution (light catches). — VIETNAM, Nha Trang, 17-26.xi.1960, leg. C.M. Yoshimoto (1 ♀ BMH).

PHILIPPINES, Luzon, Isabela prov., San Mariano, leg. T.Schneirla & A.Reyes: 19.iv.1961 (4 ♀), 25.v.1961 (3 ♀) (AMNH). Laguna, Los Banos, leg. F.X. Williams, at light: 19.vi.1921 (2 ♀), 25.vi.1921 (1 ♀), 20.xi.1921 (6 ♀), Old Forestry Building 10.ii.1922 (4 ♀) (HSPA); same loc., 19-20.ix.1959, leg. L.Quate & C.Yoshimoto, light trap (11 ♀ BMH). Camarines Sur, Mt. Isarog, 750-850 m (or otherwise stated), leg. H.M. Torre Villas: 500-600 m 16.iv.1963 (2 ♀), 21.iv.1963 (9 ♀), 1000-1500 m 23.iv.1963 (1 ♀), 24.iv.1963 (series ♀), 25.iv.1963 (8 ♀), 26.iv.1963 (series ♀), 27-30.iv.1963 (7 ♀), 8-9.v.1963 (10 ♀), 10-12.v.1963 (2 ♀), 13-15.v.1963 (series ♀), 15-17.v.1963 (6 ♀), 16-18.v.1963 (series ♀), 21-22.v.1963 (1 ♀) (all BMH); Mt. Iriga, 500-600 m, 6.iv.1962, leg. H. Torre Villas (11 ♀ BMH). Albay, Mt. Mayon, leg. H.M. Torre Villas: 900-1000 m 6.v.1962 (1 ♀), 1000-1500 m 8.v.1962 (4 ♀), 900 m 10.v.1962 (1 ♀), 1200-1800 m 15.v.1962 (1 ♀) (all BMH). — Busuanga I., 4 km N San Nicolas, leg. H. Holtmann, light trap: 24.v.1962 (1 ♀), 25.v.1962 (1 ♀), 26.v.1962 (17 ♀) (all BMH). — Culion I., 6 km W Culion, 6.vi.1962, leg. H. Holtmann, light trap (1 ♀ BMH). — Leyte, Dagami, 14 mi SW Tacloban, leg. T.Schneirla & A.Reyes: 18.vii.1961 (series ♀), 11.viii.1961 (series ♀) (AMNH); Abuyog, 25 mi S Tacloban, 7.vii.1961, leg. T.Schneirla & A.Reyes (series ♀ AMNH). — Palawan, Brooke's Point, Uring Uring, 15.viii.1961, Noona Dan Exp. 1961-62 (1 ♀ ZMC); Brooke's Point, Makagwa, 22.viii.1961, Noona Dan Exp., 1961-62 (4 ♀ ZMC). Mantalingajan, Pinigisan, 600 m, Noona Dan Exp. 1961-62, Malaise trap or Mercury light (with time of night): 3.ix.1961 (19.00-24.00, 1 ♀), 6.ix.1961 (18.00-06.00, 1 ♀; 20.00-03.15, 3 ♀), 7.ix.1961 (23.30-05.00, 1 ♀), 9.ix.1961 (18.00-06.00, 1 ♀), 10.ix.1961 (1 ♀), 11.ix.1961 (series ♀), 13.ix.1961 (18.00-02.00, 2 ♀), 17.ix.1961 (19.00-03.00, 5 ♀), 21.ix.1961 (19.00-03.00, 4 ♀), 23.ix.1961 (4 ♀; 19.00-02.00, 3 ♀) (all ZMC); Tagabung, 1150 m, Noona Dan Exp. 1961-62, Malaise trap or Mercury light: 15.ix.1961 (1 ♀; 19.00-03.00, 2 ♀), 17.ix.1961 (19.00-03.30, 8 ♀), 19.ix.1961 (18.00-06.00, 1 ♀) (all ZMC). — Balabac, Dalawan Bay, Noona Dan Exp. 1961-62, at Mercury light or at light from Petromax: 5.x.1961 (19.30-04.00, series ♀), 7.x.1961 (19.00-06.00, 1 ♀), 8.x.1961 (19.00-23.30, series ♀), 9.x.1961 (18.30-03.00, series ♀), 12.x.1961 (18.30-23.30, 3 ♀) (all ZMC). — Negros or., Dumagaete, 390 m, 24.vi.1958, leg. H.E. Milliron, light trap near jungle ravine (series ♀ BMH); same loc., 26-29.ix.1959, leg. L.Quate & C.Yoshimoto, light trap (1 ♀ BMH); Camp Lookout, Damaguete: 1300 ft. 15.ii-15.iv.1961 (35 ♀), 1800 ft. 15.iii-10.iv.1961 (31 ♀), 1600 ft. 14.v.1961 (17 ♀) (all BMH); Mt. Talinas, 900-1500 m, leg. H.E. Milliron, light trap in rain forest: 8.vi.1958 (series ♀), 7-11.vi.1958 (1 ♀), 9.vi.1958 (1 ♀), 28.vi.1958 (series ♀) (all BMH). — Mindanao, Zamboanga del Sur, Lemesehan, 600 m, 7.ix.1958, leg. H.E. Milliron, light trap (20 ♀ BMH); Milbuk, 9-10.viii.1958, leg. H.E. Milliron, light trap (2 ♀ BMH); 11 km NW Milbuk, 390 m, 5.viii.1958, leg. H.E. Milliron, 'logged area' or 'in jungle' (series ♀ BMH); 19 km NW Milbuk, 390 m, 7.viii.1958, leg. H.E. Milliron, in jungle (6 ♀ BMH); 24 km NW Milbuk, nr. Lebak, 450-900 m, 6-7.viii.1958, leg. H.E. Milliron (8 ♀ BMH). Misamis or., Mt. Balatukan, 15 km SW Gingoog, leg. H.M. Torre Villas: 600-700 m 20-24.iv.1960 (series

♀), 1000-2000 m 27-30.iv.1960 (series ♀), 1000-2000 m 1-5.v.1960 (4 ♀) (all BMH); Hindangon, 20 km S Gingoog, 600-700 m, 20-24.iv.1960, leg. H.M.Torrevillas, partly at light (33 ♀ BMH); Balason, leg. H.M.Torrevillas: 4.iv.1960 (2 ♀), 5.iv.1960 (1 ♀) (BMH). Lanao, Mirawi, MSU-campus, 29.xi.1964, leg. J.T.Wiebes (series ♀ RMNH 1979); Butig Mts, 4-6 km NE Butig, 900 m, 19-21.vi.1958, leg. H.E.Milliron (2 ♀ BMH); do., 24 km NE Butig, 1020 m, leg. H.E.Milliron, rain forest: 20.vi.1958 (1 ♀), 21.vi.1958 (series ♀) (BMH). Cotabato, Nupal Makar, v.1932, leg. F.Rivera (35 ♀ USNM). Agusan, Los Arcos, 19-23.xi.1958, leg. L.Quate (3 ♀ BMH). Davao, Genitalan, 8 km NW Mt.Apo, 690 m, 17.viii.1958, leg. H.E.Milliron (4 ♀ BMH). — Jolo I., Jolo, 31.viii.1958, leg. H.E.Milliron, at light (1 ♀ BMH). — Tawi Tawi I., Lapid Lapid at Manalik Channel, 19.xi.1961, Noona Dan Exp. 1961-62, Mercury light (19.00-02.00, 17 ♀ ZMC); Tarawakan, N Batu Batu, Noona Dan Exp. 1961-62, partly at Mercury light: 20.x.1961 (18.30-21.30, 5 ♀), 21.x.1961 (18.30-03.00, 4 ♀), 12.xi.1961 (18.00-23.30, 4 ♀), 13.xi.1961 (7 ♀), 14.xi.1961 (11 ♀), 15.xi.1961 (1 ♀) (all ZMC).

INDONESIA, Celebes (N), Goeroepahi, 13.iv.1917, at light (2 ♀ RMNH 2529).

NEW GUINEA, West, Vogelkop, Kebar Val. W Manokwari, 550 m, 4-31.x.1962, leg. S. & L.Quate, light trap (1 ♀ BMH); Fak Fak, S coast Bomberai, 10-100 m, leg. J. L. Gressitt, light trap: 1.vi.1959 (4 ♀), 10.vi.1959 (3 ♀) (BMH); same loc., 100-700 m: 4.vi.1959 (6 ♀), 8.vi.1959 (3 ♀) (BMH); Danowaria, 2.vi.1959, leg. J.L.Gressitt (1 ♀ BMH). Schouten I., Biak, end of air strip, 14.ix.1957, leg. J.L.Gressitt, light trap (29 ♀ BMH, 25 ♀ RMNH 2530). Japen I., Serui (Seroei), leg. H.Holtmann, light trap in jungle: 16.vii.1959 (2 ♀), 14.xi.1962 (3 ♀) (BMH); SSE Samberbaba, Dawai R., leg. H.Holtmann, light trap in jungle: 20.x.1962 (1 ♀), 22.x.1962 (11 ♀), 26.x.1962 (1 ♀), 27.x.1962 (1 ♀), 30.x.1962 (7 ♀), 31.x.1962 (30 ♀), 11.xi.1962 (1 ♀) (all BMH). Nabire, S Geelvink Bay, leg. J.L.Gressitt and/or J.Sedlacek: 1-20 m 2-9.vii.1962 (3 ♀), 0-30 m 2-9.vii.1962 (10 ♀), 70 m 7.vii.1962 (2 ♀), 10 m light trap 25-27.viii.1962 (1 ♀), 5-50 m 25.viii-2.ix.1962 (1 ♀), 10-15 m 1-5.ix.1962 (2 ♀) or leg. H.Holtmann, light or malaise trap in jungle: 5-50 m 25.viii-2.ix.1962 (22 ♀), 10-40 m 7.ix.1962 (2 ♀), 26.ix.1962 (3 ♀), 2.x.1962 (1 ♀), 7.x.1962 (6 ♀) (all BMH). Kutsime, W Swart Val., 1500 m, 14.xi.1958, leg. J.L.Gressitt, light trap (1 ♀ BMH); Sarmi, 20-23.vii.1959, leg. T.C.Maa, MV light trap (11 ♀ BMH); Hol Maffin 22 km E Sarmi, leg. T.C.Maa: 1.vii.1959, MV light trap (1 ♀), 18.vii.1959 (1 ♀) (BMH); River Tor (mouth), 4 km E Hol Maffin, 1.vii.1959, leg. T.C.Maa, at light (1 ♀ BMH); Bodem 11 km SE Oerberfaren, leg. T.C.Maa, in MV light trap: 10-17.vii.1959 (9 ♀), 100 m: 7-17.vii.1959 (series ♀), 10.vii.1959 (3 ♀), 14-17.vii.1959 (14 ♀) (all BMH); Ifar, Cyclops Mts, 300-500 m, 26-28.vi.1962, leg. J.L.Gressitt & J.Sedlacek, light trap (1 ♀ BMH); Sentani, (MV) light trap, leg. J.L.Gressitt & T.C.Maa: 100 m 15.vi.1959 (25 ♀), 20-24.vi.1959 (2 ♀), 90 + m 26.vi.1959 (1 ♀) (all BMH); Hollandia, 100 m, leg. J.L.Gressitt, light trap: 27.vii.1955 (19 ♀), 23.viii.1955 (28 ♀), 24.viii.1955 (16 ♀) (all BMH); Hollandia, 28.ii.1960, leg. T.C.Maa, MV light trap (3 ♀ BMH); Hollandia-binnen, leg. J.L.Gressitt, light trap: 25 m 16.x.1957 (25 ♀), 100 m: 23.ix.1958 (9 ♀), 24.ix.1958 (5 ♀), 31.x.1958 (1 ♀) and 20-25 m 15.vi.1959 (8 ♀) (all BMH); Waris, S Hollandia, 450-500 m, leg. T.C.Maa or J.L.Gressitt, at light or by sweeping: 1-2.viii.1959 (2 ♀), 1-7.viii.1959 (1 ♀), 8-15.viii.1959 (15 ♀), 16-23.viii.1959 (25 ♀), 24-31.viii.1959 (89 ♀, 25 of which RMNH 2531) (all BMH). Bokondini, 40 km N Baliem Val., ca 1300 m, leg. S. & L.Quate: 5-11.xi.1961 (1 ♀), 16-23.xi.1961 (1 ♀) (BMH). Northeast, Torricelli Mts., Mobitei, 750 m, 5-15.iii.1959, leg. W.W.Brandt (3 ♀ BMH); Maprik, 160 m, leg. J.L.Gressitt, at light: 14.x.1957 (5 ♀), 15.x.1957 (2 ♀) (BMH). Upper Jimmi Valley, Korop, 1300 m, 12.vii.1955, leg. J.L.Gressitt, light trap (4 ♀ BMH); Tsenga, 1200 m, leg. J.L.Gressitt, light trap: 13.vii.1955 (1 ♀), 14.vii.1955 (6 ♀) (BMH); Wum, 840 m, leg. J.L.Gressitt (and T.C.Maa), light trap: 16.vii.1955 (3 ♀), 17.vii.1955 (4 ♀), 18.vii.1955 (11 ♀) (all BMH). Adelbert Mts., Wanuma, 800-1000 m, leg. J.L.Gressitt, light trap: 23.x.1958 (series ♀), 26.x.1958 (3 ♀) (BMH).

Karimui, S Goroka, 1000 m, leg. J.L. & M.Gressitt, light trap: 3.vi.1961 (2 ♀), 4.vi.1961 (1 ♀), 8.vi.1961 (1 ♀) (BMH). Finisterre Range, Saidor: Sibog Vill., 27.v.5.vi.1958, leg. W.W.Brandt (1 ♀ BMH). Markham Valley, Umi R., no. 14, 480 m, 20.xi.1959, leg. L.J.Brass (6th Archbold Exped.) (12 ♀ AMNH); Bubia, 50 m, 17.ix.1955, leg. J.L.Gressitt (1 ♀ BMH); Bulem R., 64 km N Lae, 29.iv.1963, leg. J.Sedlacek (2 ♀ BMH); nr. Busu R., NE Lae, Sangeman Village, 25 m, 30.viii.1957, leg. D.E.Hardy, light trap (5 ♀ BMH); Busu R., E Lae, 100 m, 13.ix.1955, leg. J.L.Gressitt (1 ♀ BMH); Wampit R. Valley: Gurakor, 45 mi from Lae, no. 3, 670 m, 8.v.1959, leg. J.L.Brass (6th Archbold Exped.) (series ♀ AMNH); Finschhafen, leg. E.S.Ross: 6.v.1944 (series ♀), 7.v.1944 (1 ♀) (CAS); Oomsis, 22 mi W Lae, 100 m, 26.iv.1959, leg. L.J.Brass (6th Archbold Exped.) (15 ♀ AMNH); Wau, 1200 m, leg. J.L.Gressitt and/or J.Sedlacek, mostly in light trap: 14.vi.1961 (3 ♀), 15.vi.1961 (25 ♀), 17.vi.1961 (33 ♀, 15 of which RMNH 2532), 8.vii.1961 (1 ♀), 15-24.xi.1961 (1 ♀), 28-30.vi.1962 (1 ♀), 2-3.vii.1962 (3 ♀), 3.vii.1962 (6 ♀), 23-27.vii.1962 (3 ♀), 13-19.ix.1962 (1 ♀), 5.x.1962 (2 ♀), 11.ii.1963 (1 ♀), 13.iv.1963 (3 ♀), 14-15.i.1965 (1 ♀), 1250 m 5.i.1963 (3 ♀), 1400 m 17.vi.1961 (11 ♀) (all BMH). Papua, Baiawa, Moi Biri Bay, 0-30 m, no. 2, v-ix.1953 (6 ♀); Biniguni, Gwariu R., 150 m, no. 3, 27.vii-14.viii.1953 (series ♀); Mt. Dayman, Maneau Range, 700 m, N slope, no. 6, 13-20.vii.1953 (2 ♀); Peria Creek, Kwagiru R., 50 m, no. 7, 17.viii-6.ix.1953 (1 ♀) (all leg. Geoffrey M. Tate, AMNH).

D'ENTRECASTEAUX I., Fergusson I.: Mts between Agamoia and Ailulua, 900 m, no. 4, 5-17.vi.1956 (3 ♀); Deidei, Gomwa Bay, 0-20 m, no. 6, 2-6.vi.1956 (series ♀). Normanby I., Waikaiuna, 0-50 m, no. 1, 25.iv.1956 (3 ♀) (all leg. L.J.Brass, 5th Archbold Exped., AMNH).

WOODLARK I. (Murua) Kulumadau Hill, leg. W. Brandt: 19-22.iii.1957 (4 ♀), 7-13.iv.1957 (12 ♀), 16-22.iv.1957 (1 ♀), 27-30.iv.1957 (9 ♀) (all BMH); 0-100 m, no. 15, 13.xi.1956 (series ♀, leg. L.J.Brass, 5th Archbold Exped., AMNH).

LOUISADE ARCH., Misima I., Mt. Sisa, 350 m, no. 7, 20.vii.1956 (2 ♀) (leg. L.J.Brass, 5th Archbold Exped., AMNH); Sudest I. [Tagula I.]: Joe Landing, 0-100 m, no. 9, 15-22.viii.1956 (3 ♀); Rambuso, 0-100 m, no. 11, 10-24.ix.1956 (10 ♀); Mt. Riu, 250-350 m, no. 10, 22.viii.1956 (series ♀), 3.ix.1956 (1 ♀) (all leg. L.J.Brass, 5th Archbold Exped., AMNH).

BISMARCK ARCH., Manus I., Lorengau, 1-75 m, 26.vi.1959, leg. P. Herman (1 ♀ BMH); Rossum, 6 km SE Lorengau, 180 m, 23.xii.1959, leg. T.C.Maa (39 ♀ BMH). — New Hanover, Banatam, Noona Dan Exp. 1961-62, Mercury light or Malaise trap: 18.iii.1962 (series ♀), 19.iii.1962 (series ♀), 20.iii.1962 (4 series ♀, 1 series RMNH 2528), 21.iii.1962 (series ♀), 24.iii.1962 (series ♀) (all ZMC). — Dyaul I., Sumuna, 7.iii.1962, Noona Dan Exp. 1961-62 (2 ♀, one in Berlese trap no. 5). — New Ireland (SW), 'Camp Bishop' 12 km up Kait R., 240 m, leg. J.L.Gressitt, light trap: 5.vii.1956 (1 ♀), 7.vii.1956 (7 ♀), 8.v.1956 (2 ♀) (all BMH); Lemkamin, Noona Dan Exp. 1961-62, Mercury light: 5.iv.1962 (7 ♀), 13.iv.1962 (3 ♀), 17.iv.1962 (1 ♀), 21.iv.1962 (2 ♀) (ZMC). — New Britain, Linga Linga Pt'n W Willaumez Pen., 1 m, leg. J.L.Gressitt, sap palm: 12.iv.1956 (2 ♀), 14.iv.1956 (2 ♀), 15.iv.1956 (4 ♀) (all BMH); Volupai, Willaumez Pen., 100 m, 17.iv.1956, leg. J.L.Gressitt, light trap (10 ♀ BMH). Gazelle Pen., Baining, St. Paul's, 350 m, leg. J.L.Gressitt, light trap: 4.ix.1955 (46 ♀, 20 of which RMNH 2533), 5.ix.1955 (22 ♀), 6.ix.1955 (3 ♀), 7.ix.1955 (4 ♀), 8.ix.1955 (series ♀), 9.ix.1955 (7 ♀) (all BMH); Gaulim, leg. J.Sedlacek: 140 m (Malaise trap) 21-27.x.1962 (20 ♀), 130 m 23-28.x.1962 (1 ♀) (BMH); Keravat, 60 m, leg. J.L.Gressitt, light trap: 31.viii.1955 (1 ♀), 10.ix.1955 (5 ♀), 11.ix.1955 (2 ♀), 30 m: 3.iv.1956 (15 ♀), 4.iv.1956 (series ♀), 5 m jungle, 9.ix.1957 (all BMH); same loc., leg. T.C.Maa, MV light trap: 20.xi.1959 (10 ♀), 135 m 20-25.xi.1959 (8 ♀) (BMH); same loc., 17-20.v.1956, leg. Gordon Dun (2 ♀ BMH); Malmalwan-Vunskanau, leg. J.L.Gressitt, partly at light: 3.v.1956 (4 ♀), 4.v.1956 (23 ♀), 6.v.1956 (series ♀), 8.v.1956 (18 ♀), 11.v.1956 (1 ♀), 5-12.v.1956 (12 ♀), 11-13.v.1956 (26 ♀), 14.v.1956

(1 ♀), 15.v.1956 (4 ♀) (all BMH); Vunskanau, 16.v.1956, leg. J.L.Gressitt (1 ♀ BMH); Rabaul, 20.v.1956, leg. J.L.Gressitt (2 ♀ BMH); Mt.Sinewit, 900 m, leg. J.Sedlacek, light trap: 5-14.xi.1962 (11 ♀), 13.xi.1962 (4 ♀), 14-16.xi.1962 (1 ♀) (all BMH); Vunabakan, 10 km E Keravat, 180 m, leg. T.C.Maa, 6-10.xi.1959 (1 ♀ BMH); Warongoi Val., 100 m, leg. J.L.Gressitt, 25.v.1956 (1 ♀ BMH). Valokai, Noona Dan Exp. 1961-62, Malaise trap: 7.vii.1962 (21 ♀), 8.vii.1962 (10 ♀), 12.vii.1962 (3 ♀) (ZMC).

SOLOMON Is., San Cristoval, Bweinaniawarikiapu, 11.viii.1960, leg. C.W.O'Brien, light trap (5 ♀ BMH).

### *Deilagaon annulatae* Wiebes

Distribution (light catches). — THAILAND, Trang prov., Khaophappa Khaochang, 200-400 m, 12.i.1964, leg. G.A.Samuelson, light trap (6 ♀ BMH, 2 ♀ RMNH 2486).

INDONESIA, Sumatra, Fort de Kock (Bukittingii), 920 m, 1925, leg. E. Jacobson, nos. 30, 37 (series ♀ coll. Grandi, 25 ♀ RMNH 2491). — Borneo, British North Borneo, Sandakan Bay, Sapagaya Lumber Camp, 2-20 m, 7.xi.1957, leg. J.L.Gressitt, light trap (1 ♀ BMH); Tawau, Quoin Hill, leg. H.Holtmann, light trap in jungle, or Malaise trap: 3-7.vii.1962 (37 ♀ BMH), 8-14.vii.1962 (25 ♀ BMH), 15-20.vii.1962 (16 ♀ BMH, 5 ♀ RMNH 2526), 26-29.vii.1962 (3 ♀ BMH); Tawau, Quoin Hill, Cocoa Res. Sta., leg. Y. Hiroshima or K.J.Kuncheria, partly 'light trap' or '225 m': 20.viii.1962 (2 ♀), 4.ix.1962 (1 ♀), 6.ix.1962 (2 ♀), 10.ix.1962 (4 ♀), 11.ix.1962 (10 ♀) 13.ix.1962 (1 ♀), 14.ix.1962 (7 ♀), 19.ix.1962 (12 ♀), 24.ix.1962 (2 ♀), 25.ix.1962 (1 ♀), 26.ix.1962 (5 ♀), 1.x.1962 (2 ♀), 3.x.1962 (8 ♀) (all BMH); 19 km NE Kalabakan, Forest Camp, partly '60 m', leg. K.J.Kuncheria: 10.x.1962 (4 ♀), 18.x.1962 (9 ♀), 19.x.1962 (27 ♀), 27.x.1962 (1 ♀), 28.x.1962 (5 ♀), 30.x.1962 (11 ♀), and leg. Y.Hirashima, Malaise trap, 1.xi.1962 (1 ♀) (all BMH). Sarawak, Kuching, Matang, 450-894 m, 15.ix.1958, leg. J.L.Gressitt & T.C.Maa, M.V. light trap (1 ♀ BMH).

PHILIPPINES, Luzon, Laguna, Los Banos, 19-20.ix.1959, leg. L.Quate & C.Yoshimoto (1 ♀ BMH). Camarines Sur, Mt.Isarog, 800 m, 27-30.iv.1963, leg. H.M.Torrevillas (1 ♀ BMH). — Leyte, Dagami, 14 mi SW Tacloban, leg. T.Schneirla & A.Reyes: 18.vii.1961 (2 ♀), 11.viii.1961 (5 ♀) (AMNH); Abyuog, 35 mi S Tacloban, 7.vii.1961, leg. T.Schneirla & A.Reyes (1 ♀ AMNH). — Culion I., 6 km W Culion, 7.vi.1962, leg. H.Holtmann, light trap (1 ♀ BMH). — Balabac I., Dalawan Bay, Noona Dan Expedition 1961-62, at light from Petromax or Mercury light: 5.x.1961 (19.30-04.00, 8 ♀), 8.x.1961 (19.00-23.30, 10 ♀), 9.x.1961 (18.30-03.00, 5 ♀) (all ZMC). — Mindanao, Zamboanga del Sur, Lemesehan, 600 m, 7.ix.1958, leg. H.E.Milliron, light trap (1 ♀ BMH); 11 km NW Milbuk, 390 m, leg. H.E.Milliron, logged area: 5.viii.1958 (series ♀ BMH, 10 ♀ RMNH 2487), 6.viii.1958 (3 ♀ BMH), 7.viii.1958 (4 ♀ BMH); 24 km NW Milbuk, near Lebak, 450-900 m, 6-7.viii.1958, leg. H.E.Milliron (7 ♀ BMH). Misamis or., Balason, leg. H.M.Torrevillas: 4.iv.1960 (4 ♀ BMH), 5.iv.1960 (3 ♀ BMH). Lanao, Butig Mts. 24 km NE Butig, 1080 m, 21.vi.1958, leg. H.E.Milliron, in rain forest (1 ♀ BMH). — Tawi Tawi I., Lapid Lapid at Manalik Channel, 19.xi.1961, Noona Dan Exp. 1961-62, Mercury light (19.00-02.00, 3 ♀ ZMC); Tarawakan, N Batu Batu, Noona Dan Exp. 1961-62, Mercury light: 21.x.1961 (18.30-03.00, 6 ♀), 12.xi.1961 (1 ♀), 13.xi.1961 (5 ♀), 14.xi.1961 (17 ♀), 15.xi.1961 (2 ♀) (all ZMC).

### *Deilagaon megarhopalum* (Grandi)

Distribution (light catches). — THAILAND, Chiang Mai, Fang, 500 m, leg. T.C.Maa: 15.iv.1958 (1 ♀ no. 377), 12-19.iv.1958 (1 ♀ no. 389), 19.iv.1958 (1 ♀ no. 378) (all BMH); Loei, Dansai, Kok Shathon, Phu Lombo, 27.xi.1954, REELBEL (16 ♀ USNM); Chanthaburi, Prew, 45 m, 24.iv-1.v.1958, leg. T.C.Maa, no. 402 (1 ♀ BMH); S Banna, Nakhon, 108 m, 5-10.v.1958, leg. T.C.Maa, no. 417 (6 ♀ BMH, 2 ♀ RMNH

2488); Trang prov., Khaophappa Khaochang, 200-400 m, 12.i.1964, leg. G.A.Samuelson, light trap (1 ♀ BMH).

MALAYA, Pahang Kuala Tahan, 200 m to Pahang Kualan Tenenggan, 220 m, 15.xii.1958, leg. J.L.Gressitt (Sl.f.Rotan) (1 ♀ BMH).

INDONESIA, Sumatra, Atjeh, Mt.Bandahasa, Bivouac 1, 25.vi-5.vii.1972, leg. J.Krikken (no. 23), at light (1 ♀ RMNH 2187); Fort de Kock (Bukittingii), 920 m, 1925, leg. E.Jacobson, nos. 30, 37 (series ♀ coll. Grandi, 25 ♀ RMNH 2490). — Java, Pelaboean Ratoe, leg. Bryant & Palmer (2 ♀ USNM); Bogor, ix.1954, leg. J. van der Vecht, at light (1 ♀ RMNH 119). — Borneo, British North Borneo, Tawau, Quoin Hill, leg. H.Holtmann, light trap in jungle, or Malaise trap: 3-7.vii.1962 (2 ♀), 8-14.vii.1962 (6 ♀), 15-20.vii.1962 (19 ♀, 10 of which RMNH 2537) (all BMH); Tawau, Quoin Hill, Cacao Res. Sta., leg. Y.Hirashima or K.J.Kuncheria, partly 'light trap', '225 m', or 'Malaise trap': 21.viii.1962 (1 ♀), 3.ix.1962 (2 ♀), 4.ix.1962 (1 ♀), 5.ix.1962 (1 ♀), 6.ix.1962 (2 ♀), 8.ix.1962 (2 ♀), 11.ix.1962 (2 ♀), 13.ix.1962 (9 ♀), 14.ix.1962 (1 ♀), 19.ix.1962 (1 ♀), 24.ix.1962 (1 ♀), 3.x.1962 (3 ♀) (all BMH); 19 km N Kalabakan, Forest Camp, '60 m' or 'light trap', leg. K.J.Kuncheria or Y.Hirashima: 10.x.1962 (2 ♀), 19.x.1962 (2 ♀), 27.x.1962 (1 ♀), 28.x.1962 (5 ♀), 30.x.1962 (3 ♀), 12.xi.1962 (1 ♀) (all BMH). Sarawak, Kuching, Matang, 450-894 m, 15.ix.1958, leg. J.L.Gressitt & T.C.Maa (1 ♀ BMH); Pangkalan Tubang Bau dist., 300-450 m, 5-8.ix.1958, leg. T.C.Maa (MB 311) (1 ♀ BMH).

PHILIPPINES, Balabac I., Dalawan Bay, Noona Dan Exp. 1961-62, at light from Petromax or Mercury light: 5.x.1961 (19.30-04.00, 8 ♀), 8.x.1961 (2 ♀; 19.00-23.30, 17 ♀, 5 of which RMNH 2534), 9.x.1961 (18.30-03.00, 1 ♀) (all ZMC).

### **Waterstoniella Grandi**

Of this genus, of which I now have some fifteen species, I here only describe one new species, which is surprisingly similar to *Deilagaon*, especially in the shape of the antennal funicle.

### **Waterstoniella clavata** spec. nov. (figs. 34-38)

Type-material. — NORTH BORNEO (SE), Forest Camp, 19 km N Kalabakan, leg. Y.Hirashima, 6.xi.1962 (1 ♀ BMH, holotype; dissected and slide-mounted). MALAYA, Pahang, Kuala Terenggan, 220 m, leg. T.C.Maa, 13.xii.1958 (paratypes: 1 ♀ BMH, dissected and slide-mounted; 1 ♀ RMNH 2485).

Female. — Head (fig. 38) as long as wide across the compound eyes. Longitudinal diameter of the eye twice as long as the cheek. Two lateral ocelli, the median one atrophied. Facial groove narrow. Antennal toruli close together, situated at a distance from the epistomal margin equal to their diameter. Antenna almost indistinguishable from that of *Deilagaon chrysolepidis* Wiebes, but the funicular segments with a single row of apical sensilla. Median prominence of the epistomal margin bilobed. Mandible (fig. 37) with one very long apical tooth, and with a small appendage; the mandible bears several long setae and it has about ten indistinct ventral lamellae; the appendage has seven lamellae, most of which are produced into a medial tooth. Labium (fig. 37) with one apical seta, the maxilla with a row of lateral setae.

Thorax without pollen-pockets. Fore wing (9:4), 2 mm long; the sub-

marginal, marginal, stigmal, and postmarginal veins approximately in ratio 9:4:2:3, the membrane with dense microtrichia; dark striae radiate from the base of the wing and from the stigma, and the area of the submarginal vein and that of the stigmal are distinctly pigmented. Hind wing (3:1), 1 mm long. Fore leg long, especially the femur: more than twice as long as the coxa and almost twice as long as the tibia; the tibial armature consists of two dorso-apical teeth and one ventral; the tarsal segments approximately in ratio 16:6:3:3:10, with many axial spines. Mid leg: tarsal ratio approximately 13:7:8:6:10. Hind leg: the tibia (fig. 34) with many setae, a row of dorsal spines, and two bidentate ventro-apical spurs: the axial one has one tooth shaped as a spatula (fig. 35); the tarsi approximately in ratio 20:10:9:6:11, with spines and a plantar fringe.

Gaster. Hypopygium (fig. 36): the spine not very long, with longitudinal rows of setae. The spiracle of the stigma on the eighth urotergite small, subcircular. Pygostyle more than twice as long as wide, with about ten apical and subapical setae.

Length (head, thorax, and gaster), 2 mm, the ovipositor 2 mm. Colour yellowish brown, the antennal club darker.

Distribution (all BMH unless otherwise indicated). — NORTH BORNEO, W Coast residency, Ranau, 8 mi N Paring hot springs, 500 m, 9-18.x.1958, leg. T.C.Maa, in light trap (3 ♀). SE, Tawau, Quoin Hill, leg. Y.Hirashima or K.J.Kuncheria, partly 'light trap' or 'Malaise trap': 3-7.vii.1962 (2 ♀), 20.viii.1962 (1 ♀), 1.x.1962 (1 ♀); 19 km NE Kalabakan, Forest Camp, '60 m' or 'Malaise trap', leg. K.J.Kuncheria or Y.Hiroshima: 11.x.1962 (1 ♀), 18.x.1962 (2 ♀), 19.x.1962 (1 ♀; 5 ♀ RMNH 2537), 30.x.1962 (1 ♀), 7-10.xi.1962 (1 ♀); Kalabakan: 8-15.xi.1958, primary forest, leg. T.C.Maa (1 ♀), 10-19.xi.1958, leg. L.W.Quate, in light trap (4 ♀), 14-15.xi.1958, leg. L.W.Quate & T.C.Maa (1 ♀); Kalabakan R, 48 km W Tawau, 9-18.xi.1958, leg. T.C. Maa (1 ♀).

#### REFERENCES

- CORNER, E. J. H., 1960. Taxonomic notes on *Ficus* Linn., Asia and Australasia i. Subgen. *Urostigma* (Gasp.) Miq. — Gdn's Bull. Singapore, 17: 368-404.
- , 1963. *Ficus* in the Pacific region. — In: J. L. GRESSITT (ed.), Pacific Basin biogeography, a symposium (Tenth Pacific Science Congress, 1961): 233-245, discussion 247-253.
- , 1965. Check-list of *Ficus* in Asia and Australasia, with keys to identification. — Gdn's Bull. Singapore, 21: 1-186.
- , 1967a. Moraceae. — In: B. HANSEN & S.-E. SANDERMAN OLSEN (ed.), Botanical report of the Danish Noona Dan Expedition 1961-62. — Dansk bot. Arkiv, 25: 64-67.
- , 1967b. *Ficus* in the Solomon Islands and its bearing on the post-Jurassic history of Melanesia. — Phil. Trans. R. Soc. Lond., (B) 253: 23-159.
- , 1975. *Ficus* in the New Hebrides. — Ibid., (B) 272: 343-367.
- GIRAULT, A. A., 1915a. Some Chalcidoid Hymenoptera from north Queensland. — Cand. Ent., 47: 42-48.
- , 1915b. Australian Hymenoptera Chalcidoidea — xiii. The family Agaonidae with

- descriptions of four new genera, six new species, and one new variety. — Mem. Qd. Mus., 4: 310-313.
- GIRAULT, A. A., 1925. Some gem-like or marvellous inhabitants of the woodlands heretofore unknown and by most never seen nor dreamt of. Brisbane, 3 p.
- , 1927. Notes on and descriptions of Chalcid wasps (Chalcididae) in the South Australian Museum. — Rec. S. Austr. Mus., 3: 309-338.
- , 1929. Notes on and descriptions of Chalcid wasps in the South Australian Museum. — Trans. R. Soc. S. Austr., 53: 309-346.
- , 1932. New lower Hymenoptera from Australia and India. Brisbane, 6 p.
- , 1933. Some beauties inhabitant not of commercial boudoirs but of nature's bosom, notably new insects. Brisbane, 5 p.
- , 1939. Five new generic names in the Chalcidoidea (Australia). — Ohio J. Sci., 39: 324-326.
- GRANDI, G., 1916. Nota su due Agaonini (Hymenoptera Chalcididae) dell'Australia. — Boll. Lab. Zool. Portici, 11: 145-159.
- , 1952a. Insetti dei fichi messicani, malesi ed australiani. — Boll. Ist. Ent. Univ. Bologna, 19: 47-67.
- , 1952b. Catalogo ragionato delle Agaonine di tutto il mondo descritte fino ad oggi (4a edizione). — Ibid., 19: 69-96.
- RAMIREZ B., W., 1969. Fig wasps: mechanism of pollen transfer. — Science, 163: 580-581.
- , 1974. Coevolution of Ficus and Agaonidae. — Ann. Missouri Bot. Gdn., 61: 770-780.
- WIEBES, J. T., 1961. On the variability of *Agaon paradoxum* (Dalman) Grandi and *Seres armipes* Waterston, with remarks on other African Agaonidae (Hymenoptera, Chalcidoidea). — Zool. Meded., Leiden, 37: 231-240.
- , 1963a. Taxonomy and host preferences of Indo-Australian fig wasps of the genus *Ceratosolen* (Agaonidae). — Tijdschr. Ent., 106: 1-112.
- , 1963b. Indo-Malayan and Papuan fig wasps (Hymenoptera, Chalcidoidea) 2. The genus *Pleistodontes* Saunders (Agaonidae). — Zool. Meded., Leiden, 38: 303-321.
- , 1968. A new *Pleistodontes* (Hymenoptera Chalcidoidea, Agaonidae) from Rennell Island. — Nat. Hist. Rennell Isl., 5: 115-117.
- , 1977. *Deilagaon*, a new genus of Indo-Malayan and Papuan fig wasps (Hymenoptera, Chalcidoidea, Agaonidae). — Bijdr. Dierk., 46: 147-154.